

## LETTER TO THE EDITOR

### MALES, AGES $\geq$ 45 YEARS, BUSINESSPERSON, FLOATING POPULATION, AND RURAL RESIDENTS MAY BE CONSIDERED HIGH-RISK GROUPS FOR TUBERCULOSIS INFECTION IN GUANGZHOU, CHINA: A REVIEW OF 136,394 TB CONFIRMED CASES

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#### To the editor

Tuberculosis (TB) is a disease caused by the chronic and continuous infection of the pathogen *Mycobacterium tuberculosis* (*M. tuberculosis*)<sup>1</sup>. It is a major public health problem that has threatened the health of human beings worldwide, especially in developing countries. Although the World Health Organization (WHO) has launched the "Global Plan to Stop Tuberculosis", which aims to save a million lives by 2015<sup>11</sup>, China, the second among the 22 high-burden countries, has different incidences and prevalence of TB in different provinces. As the largest trading city in southern China, Guangzhou, located in the southern subtropical, with over 7.94 million registered inhabitants and 4.76 million floating population<sup>6</sup>, here TB has become one of the extremely common airborne transmission diseases. According to the document from Guangzhou Center for Disease Control and prevention (GZCDC), a total of 19,701 cases were newly diagnosed in 2012, yielding annual incidence rate of 1545.01 per 100,000 inhabitants, public health authorities are concerned about its unacceptably high prevalence.

In this study, we obtained data of TB cases in Guangzhou during the period of 2007-2012, from the National Notifiable Disease Report System (NNDRS). Descriptive statistics are used to describe the basic features of TB confirmed cases, chi-square test was used to exam linear trends in proportions by years. In China, TB is a notifiable Class-B communicable disease, all cases were diagnosed according to the unified diagnostic criteria issued by Chinese Ministry of Health, for a patient's illness to meet the case definition for TB the clinical signs (cough, coughing up blood, night sweat, fatigue, fever, and weight loss, etc) must be present and taken samples for laboratory confirmation (TB skin test, TB blood test, sputum smears and cultures, chest radiograph (X-ray), and appropriate laboratory tests). A standard form was adopted by local physicians and epidemiologist to collect individual information on each TB case, including age, address, onset date, diagnosis, and laboratory test result. Routine case reporting is done by hospitals through NNDRS within 24 hours.

From January 1, 2007 to December 31, 2012, a total of 136,394 TB confirmed cases were reported in Guangzhou, of which 69.83% (95,240) were male patients and 30.17% (41,154) were female patients. Annual incidence rate from 2007 to 2012 was 2612.33, 2384.31, 2103.75, 1822.62, 1609.18, and 1545.01 (per 100,000), respectively, showing a declining trend. The age ranged from 0.6 to 103 years (mean age was 40.41 years). The proportion of confirmed cases between <5, 6-19, 20-44, 45-64, and >65 was 0.43% (581), 6.63% (9038), 2.61% (3565), 78.33% (106842), and 12.00% (16368), respectively. By occupation, the highest proportion of cases was businessperson, which accounted for 29.31% (39,974) of all cases, followed by workers and farmers, which accounted for 23.01% (31,380) and 14.70% (20,050), respectively. Majority of cases lived in rural areas (69.65%). Notably, from 2007 to 2012, the proportion of patients identified as the floating population was 21.47%

(5591), 19.29% (4843), 22.43% (5264), 28.06% (6070), 31.82% (6507), and 33.41% (6583),  $\chi^2_{\text{linear trend}} = 1939.38$ ,  $p = 0.00$  (Table 1).

Despite the overall incidence rate of TB declined gradually in recent years, we found the proportion of patients identified as the floating population appeared an increasing trend by years. Similar observation was also reported in Wuhan city of China<sup>15</sup>. In Guangzhou, majority of the floating population are rural-to-urban migrants, they usually lived in crowded places, with poor sanitation, low health risk awareness, and limited access to health care<sup>10,13</sup>. Numerous studies revealed that compared to permanent residents, the floating population have higher incidence in many infectious diseases such as malaria<sup>1</sup>, measles<sup>5</sup>, and influenza<sup>7</sup>, etc. Furthermore, it is also reported that the floating population are at greater risk for HIV infection than the general Chinese population<sup>14</sup>. Once people coinfect with TB and HIV, the risk of reactivation increases to 10% per year<sup>12</sup>, mortality increases dramatically<sup>9</sup>. This suggested that more efforts should be directed towards improvement of TB control among the floating population.

In contrast to the finding from Africa where TB primarily affects adolescents and young adults<sup>3</sup>, we found more than 90% of cases reported were in the ages  $\geq$  45 years. This is because since 1978, BCG vaccine has been incorporated into Child Immunization Program in China<sup>2</sup>. According to the routine immunization schedule, BCG is given to children under 15 years of age, free of charge. However, most people at present aged 45 years and older have not been vaccinated, this make them more susceptible to TB infection compared to those vaccinated. We also found that the majority of TB cases are rural residents, this is consistent with the study from most of Chinese cities<sup>8</sup>. In addition, by occupation, businesspeople accounted for the highest proportion of cases, the gender of TB confirmed cases was more heavily male than female. One possible explanation for this might be that these people are more active in social activities, therefore more likely to contact with TB cases.

Taken together, we reported that the TB infection continued to have fairly high prevalence in Guangzhou, China. Among the patients, the floating population has made up a noticeable percentage and has appeared as an increasing trend on years. The male, age  $\geq$  45 years, businesspersons, and rural residents may be also considered high-risk groups for tuberculosis infection. This information may be useful for TB control programs in the future.

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**Table 1**  
Statistical summary of tuberculosis cases reported in Guangzhou, China, 2007-2012

|                       | 2007  |       | 2008  |       | 2009  |       | 2010  |       | 2011  |       | 2012  |       | 2007-2012 |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|-------|
|                       | N     | %     | N     | %     | N     | %     | N     | %     | N     | %     | N     | %     | N         | %     |
| <b>Gender</b>         |       |       |       |       |       |       |       |       |       |       |       |       |           |       |
| Female                | 7701  | 29.58 | 7482  | 29.80 | 7083  | 30.19 | 6681  | 30.88 | 6236  | 30.49 | 5971  | 30.31 | 41154     | 30.17 |
| Male                  | 18335 | 70.42 | 17625 | 70.20 | 16381 | 69.81 | 14953 | 69.12 | 14216 | 69.51 | 13730 | 69.69 | 95240     | 69.83 |
| <b>Age</b>            |       |       |       |       |       |       |       |       |       |       |       |       |           |       |
| 0-5                   | 104   | 0.40  | 88    | 0.35  | 112   | 0.48  | 104   | 0.48  | 85    | 0.42  | 88    | 0.45  | 581       | 0.43  |
| 6-19                  | 1781  | 6.84  | 1770  | 7.05  | 1635  | 6.97  | 1421  | 6.57  | 1299  | 6.35  | 1132  | 5.75  | 9038      | 6.63  |
| 20-44                 | 699   | 2.68  | 684   | 2.72  | 609   | 2.60  | 612   | 2.83  | 536   | 2.62  | 425   | 2.16  | 3565      | 2.61  |
| 45-65                 | 20257 | 77.80 | 19208 | 76.50 | 18239 | 77.73 | 16885 | 78.05 | 16360 | 79.99 | 15893 | 80.67 | 106842    | 78.33 |
| >65                   | 3195  | 12.27 | 3357  | 13.37 | 2869  | 12.23 | 2612  | 12.07 | 2172  | 10.62 | 2163  | 10.98 | 16368     | 12.00 |
| <b>Patient type</b>   |       |       |       |       |       |       |       |       |       |       |       |       |           |       |
| Local residents       | 20445 | 78.53 | 20264 | 80.71 | 18200 | 77.57 | 15564 | 71.94 | 13945 | 68.18 | 13118 | 66.59 | 101536    | 74.44 |
| Floating people       | 5591  | 21.47 | 4843  | 19.29 | 5264  | 22.43 | 6070  | 28.06 | 6507  | 31.82 | 6583  | 33.41 | 34858     | 25.56 |
| <b>Occupation</b>     |       |       |       |       |       |       |       |       |       |       |       |       |           |       |
| Business              | 7131  | 27.39 | 6532  | 26.02 | 6679  | 28.46 | 5988  | 27.68 | 6830  | 33.40 | 6814  | 34.59 | 39974     | 29.31 |
| Worker                | 7034  | 27.02 | 6932  | 27.61 | 5921  | 25.23 | 5753  | 26.59 | 3384  | 16.55 | 2356  | 11.96 | 31380     | 23.01 |
| Farmer                | 4116  | 15.81 | 3914  | 15.59 | 3355  | 14.30 | 2850  | 13.17 | 3054  | 14.93 | 2761  | 14.01 | 20050     | 14.70 |
| Household             | 2689  | 10.33 | 2543  | 10.13 | 2851  | 12.15 | 2638  | 12.19 | 3347  | 16.37 | 3930  | 19.95 | 17998     | 13.20 |
| Retirees              | 2979  | 11.44 | 3249  | 12.94 | 2825  | 12.04 | 2837  | 13.11 | 2564  | 12.54 | 2703  | 13.72 | 17157     | 12.58 |
| Student               | 1049  | 4.03  | 964   | 3.84  | 956   | 4.07  | 849   | 3.92  | 741   | 3.62  | 638   | 3.24  | 5197      | 3.81  |
| Clerk                 | 591   | 2.27  | 541   | 2.15  | 448   | 1.91  | 338   | 1.56  | 226   | 1.11  | 206   | 1.05  | 2350      | 1.72  |
| Teacher               | 201   | 0.77  | 172   | 0.69  | 165   | 0.70  | 135   | 0.62  | 104   | 0.51  | 81    | 0.41  | 858       | 0.63  |
| Scattered children    | 88    | 0.34  | 92    | 0.37  | 115   | 0.49  | 114   | 0.53  | 94    | 0.46  | 94    | 0.48  | 597       | 0.44  |
| Doctor                | 79    | 0.30  | 109   | 0.43  | 109   | 0.46  | 82    | 0.38  | 66    | 0.32  | 74    | 0.38  | 519       | 0.38  |
| Driver                | 22    | 0.08  | 22    | 0.09  | 15    | 0.06  | 13    | 0.06  | 7     | 0.03  | 11    | 0.06  | 90        | 0.07  |
| Fisherman             | 15    | 0.06  | 12    | 0.05  | 11    | 0.05  | 15    | 0.07  | 17    | 0.08  | 15    | 0.08  | 85        | 0.06  |
| Kindergarten children | 25    | 0.10  | 10    | 0.04  | 7     | 0.03  | 8     | 0.04  | 2     | 0.01  | 6     | 0.03  | 58        | 0.04  |
| Herdsmen              | 8     | 0.03  | 6     | 0.02  | 4     | 0.02  | 5     | 0.02  | 8     | 0.04  | 9     | 0.05  | 40        | 0.03  |
| Nurse                 | 9     | 0.03  | 9     | 0.04  | 3     | 0.01  | 9     | 0.04  | 8     | 0.04  | 3     | 0.02  | 41        | 0.03  |
| <b>Residence</b>      |       |       |       |       |       |       |       |       |       |       |       |       |           |       |
| City/town             | 8478  | 32.56 | 7932  | 31.59 | 7098  | 30.25 | 6431  | 29.73 | 5879  | 28.75 | 5578  | 28.31 | 41396     | 30.35 |
| Rural                 | 17558 | 67.44 | 17175 | 68.41 | 16366 | 69.75 | 15203 | 70.27 | 14573 | 71.25 | 14123 | 71.69 | 94998     | 69.65 |

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